



**Montana Department of Natural Resources and Conservation
Cooperating Technical Partners
Mapping Activity Statement**

Agreement No. 2- Digital Topographic Data Development

In accordance with the Cooperating Technical Partners (CTP) Memorandum of Agreement dated April 4, 2000, between the Montana Department of Natural Resources and Conservation, Water Resources Division (hereinafter referred to as Montana DNRC), and the Federal Emergency Management Agency (FEMA), Mapping Activity Statement No. 2 is as follows:

- 1. Objective and Scope:** The objective of this Mapping Activity is to develop digital topographic data and mapping for the Yellowstone and Tongue Rivers in the vicinity of the City of Miles City, Custer County, Montana. The digital topographic data and mapping will be provided for a 12-mile segment of the Yellowstone River, extending approximately 3 miles upstream (west) of Montana Highway 22 at Miles City to approximately 9 miles downstream (east) of Montana Highway 22; and a 6-mile segment of the Tongue River, extending from the confluence with the Yellowstone River to a point approximately 6 miles upstream. The digital topographic data and mapping will be developed using airborne Light Detection and Ranging (LIDAR) technology and will be used for hydraulic modeling and floodplain mapping to produce Digital Flood Insurance Rate Maps (DFIRMs) for the City of Miles City and the unincorporated areas of Custer County, Montana.
- 2. Period of Performance:** The period of performance for this Mapping Activity will be October 1, 2001, through September 30, 2002, unless otherwise adjusted with the approval of the Montana DNRC and FEMA.
- 3. Funding/Cost-Sharing:**
- 4. Standards:** The following standards and documents are relevant to this Mapping Activity:
 - Survey Methodology:
 - Global Positioning System (GPS) Surveys: Follow National Geodetic Survey (NGS)-58, "Guidelines for Establishing GPS-Derived Ellipsoid Heights (Standard: 2 cm and 5 cm)," November 1997.
 - Aerial Surveys: Follow EM 1000-1-1000, "Photogrammetric Mapping," March 31, 1993.
 - Conventional Surveys: Follow standard American Congress on Surveying and Mapping (ACSM) procedures.
 - Hydro Surveys: Follow EM 1110-2-1003, "Hydrographic Surveys," October 31, 1994.
 - Draft LIDAR specifications appear as Appendix 4B in FEMA 37, *Flood Insurance Study Guidelines and Specifications for Study Contractors* (January 1995) and are available on the FEMA Flood Hazard Mapping website at http://www.fema.gov/mit/tsd/dl_scg.htm
 - FEMA is in the process of revising Appendix 4 of FEMA 37, "Aerial Mapping and Surveying Specifications." The revisions will include procedures for evaluating

Triangulated Irregular Network (TIN) data in accordance with the new National Standards for Spatial Data Accuracy for data used in automated and semi-automated hydrologic and hydraulic modeling. Once those specifications are complete, they will apply to this Mapping Activity.

- Digital mapping submissions will comply with the requirements of Chapter 9 and Appendix 7 of FEMA 37.

2. Products: The Montana DNRC shall make the following products available to FEMA:

- TIN data on CD-ROM;
- Hardcopy topographic maps;
- Report summarizing methodology and results;
- Completed Form 5 from the MT-2 application/certification forms package, which is available from the FEMA website at http://www.fema.gov/mit/tsd/dl_mt-2.htm.
- Checkpoint analyses to assess the accuracy of TIN data including Root Mean Square Error (RMSE) calculations to support vertical accuracy;
- Identification of remote-sensing data voids and methods used to supplement data voids; and
- National Geodetic Survey data (NGS) sheets for Network Control Points (NCPs) used to control remote sensing and ground surveys.

3. Schedule and Milestones:

Milestone 1: Upon completion, the Montana DNRC will provide the following products for this milestone to the FEMA Regional Project Officer identified in Section 11 of this Mapping Activity Statement:

- Documentation of methodology, data analyses, date of survey/data collection, NCPs, and other relevant information; and
- Work plan for supplementing data voids caused by limitations of remote sensing and/or source of any supplementary data collection.

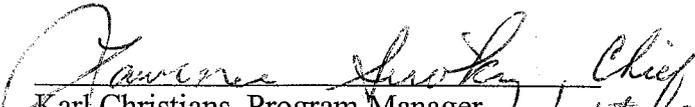
Milestone 2 (Final Products): Upon completion, the Montana DNRC will provide the following products for this milestone to the FEMA Regional Project Officer identified in Section 11 of this Mapping Activity Statement:

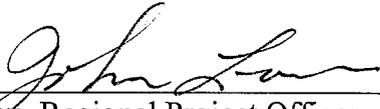
- TIN data on CD-ROM;
- Hardcopy topographic maps;
- Report summarizing methodology and results;
- Completed Form 5 from the MT-2 application/certification forms package;
- Checkpoint analyses to assess the accuracy of TIN data including RMSE calculations to support vertical accuracy;
- Identification of remote sensing data voids and methods used to supplement data voids; and
- NGS data sheets for NCPs used to control remote sensing and ground surveys.

The Montana DNRC will make final products available in accordance with the Period of Performance described in Section 2 of this Mapping Activity Statement.

4. **Certification:** A Registered Professional Engineer or Licensed Land Surveyor will certify topographic information, in accordance with Paragraph 65.5(c) of the National Flood Insurance Program regulations. Certification by the American Society for Photogrammetry and Remote Sensing also is acceptable.
5. **Technical Assistance and Resources:** The Montana DNRC may request support from the FEMA Flood Map Production Coordination Contractor (MCC) in setting up control networks, assessing TIN data accuracy, and merging ground surveys with remote sensing to fill data voids. Specific technical and programmatic support provided through the FEMA MCC should be requested through the FEMA MCC Project Officer specified in Section 9 of this Mapping Activity Statement. The MCC may be contacted at (703) 960-8800.
6. **Contractors:** The Montana DNRC plans to use Horizon, Inc., as the LIDAR contractor for mapping activities under this Mapping Activity Statement.
7. **Quality Assurance/Quality Control (QA/QC) Procedures:** The QA/QC procedures outlined in Chapter 10 and Appendix 4 of FEMA 37 should be followed during the development of topographic data for hydrologic and hydraulic modeling and floodplain mapping. The data should be independently reviewed for compliance with the standards defined in Section 4 of this Mapping Activity Statement. This independent review will be conducted by the Montana DNRC.
8. **Reporting:** Reporting requirements will be in accordance with Agreement Articles V and VI.
9. **Points of Contact:** The FEMA Regional Project Officer is John Liou, P.E., C.F.M., and the CTP Project Manager is Karl Christians or subsequent personnel of comparable experience who are appointed to fulfill these responsibilities. If it is necessary, the Montana DNRC should request the assistance of the FEMA MCC through the FEMA Regional Project Officer or the FEMA MCC Project Officer, Mike Grimm.

Each of the undersigned parties concurs with the description of the mapping activities summarized in this Mapping Activity Statement.


Karl Christians, Program Manager *Chief Water Operations* Date 5-21-02
Montana Department of Natural Resources and Conservation, Water Resources Division


John Liu, Regional Project Officer Date 4-26-02
Federal Emergency Management Agency